

## **APPENDIX IV**

Discussion Paper on

Inshore Sector Catcher Vessel Cooperatives in the  
Bering Sea/Aleutian Islands Pollock Fisheries

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## Executive Summary

Our analysis addresses three issues: whether implementation of inshore American Fishery Act (AFA) cooperatives will have beneficial or adverse effects on independent vessel owners, which features of the AFA rules or characteristics of the inshore sector increase the probability of adverse results, and the effects of three alternative proposals on the participants in the inshore sector.

The first thing to note is that this fishery is unsuitable for analysis using a model of perfect competition. Three companies dominate the processing sector, while the harvesting sector can legally negotiate under the umbrella of a bargaining association. These participants are keenly aware of their strategic interdependence, and that necessitates the use of tools from game theory. Our analysis is based on the implications of bargaining theory, which deals with the division of rent between game players. We define three types of players: independent catcher vessels (ICVs), processor-controlled catcher vessels (PCVs), and processors.

The benchmark we have been instructed to use in assessing the effects of AFA cooperatives on ICVs is the inshore sector with all provisions of the AFA in place except those concerning the implementation of cooperatives. This benchmark does not correspond to any year's actual conditions. It differs from pre-AFA conditions with respect, for example, to allowable catch, and it differs from 1999 conditions because under the benchmark there would be no prospect of cooperatives being formed next year. Therefore, outcomes under the benchmark can only be evaluated qualitatively.

The total rents in the inshore sector under the benchmark would be larger than pre-AFA conditions, because the increase of almost one-third in the sector's share of total allowable catch is only partially offset by the associated tax of 0.6 cents per pound of deliveries. It is unlikely that the increase in allowable catch would alter the players' relative bargaining strengths significantly, and therefore each type of participant would be expected to do at least as well under the AFA without cooperatives as it had done in the pre-AFA fishery. However, determining what the relative bargaining strengths actually were, and therefore what the distribution of rents under the benchmark would be, is difficult.

Processors have a number of important bargaining advantages. Their ownership of catching vessels reduces their reliance on supply from ICVs, while also providing them an informational advantage given that ICVs do not own processing plants. Because the processing sector is highly concentrated, entry is prohibited, and the situation in the fishery is a repeated game, processors are expected to realize that aggressive tactics yielding short-term gains are unlikely to be profitable in the long-run, and capacity constraints under the benchmark would help them refrain from engaging in such tactics. Although the ICVs do have the advantage of being able to legally bargain as a group, we conclude that on balance the processors have substantially more bargaining power than ICVs. Therefore, we expect outcomes under the benchmark to favor processors over ICVs.

Unlike the benchmark, the actual AFA includes provisions for the formation of harvesting cooperatives. To the extent that the cooperatives are implemented, the race for fish will abate. The resulting rationalization will increase both the total rents in the fishery and the effective amount of capacity in harvesting and processing.

The increase in the effective amount of processing capacity will provide more opportunities for processors to engage in aggressive competition, but the long-term incentives for refraining from doing so will remain. The existence of PCVs will continue to provide the same bargaining advantages as under the benchmark, and in addition will now provide the processor influence over its cooperative's decisions. If an ICV does not join a cooperative, or chooses to change the processor it is assigned by the AFA rules, it has to compete for the fish not allocated to cooperatives. The term "open-access fishery" will be used to refer to this part of the inshore pollock fishery, with the understanding that access of catcher vessels and processors will be limited by the AFA. The "outside option" for an ICV is the return it can obtain in this open-access fishery.

If the open-access under the AFA were the same as open access under the benchmark, then ICVs could not be adversely affected by the AFA provisions for cooperatives. However, open access would be the same in the two cases only if no cooperatives were in fact formed under the AFA, which would not be an equilibrium outcome. Under most plausible scenarios for open access under the AFA, ICVs would do worse in open access under the AFA than in the benchmark case. Therefore, we conclude that there is a significant probability that ICVs will be adversely affected by the AFA's provisions for cooperatives.

We stress that we are not predicting that ICVs will be adversely affected, only that the possibility that they would be cannot be dismissed. We also note that, whatever the results at the aggregate level, the results for individual ICVs will vary, with some likely to benefit even if the results at the aggregate level are adverse, and vice versa. In particular we expect that, other things equal, an ICV will do better the less influential that PCVs are in its cooperative. Lastly, it should be noted that because the benchmark is not the ICV's outside option under the AFA, the decision to join a cooperative does not imply that an ICV is better off under the AFA than under the benchmark.

Economic characteristics of the inshore sector that substantially increase the probability of adverse effects are the degree of concentration in the harvesting sector, the number and importance of PCVs, the existence of catcher vessels whose share of catch history is substantially less than their relative catching power, and the difficulty of specifying long-term price contracts. The most important features of the AFA cooperative rules are that a catcher vessel can only join the cooperative for which it qualifies based on the prior year's fish deliveries, implying that it must go through open access to change processors, and the restriction that a cooperative can sell no more than 10% of its catch to a processor other than the one for which it is qualified.

One of the alternatives to the AFA that we evaluated, the Dooley-Hall proposal, would remove the qualification requirements, so that a cooperative could deliver to any processor, and any eligible catcher vessel could join any cooperative. Except for the requirement of belonging to a cooperative with at least five members, the Dooley-Hall proposal is equivalent to an individual fishing quota (IFQ) program.

There is little question that ICVs would be better off, and processors worse off, under the Dooley-Hall proposal than under the AFA. ICVs would also be better off relative to the benchmark. Processors might or might not be adversely affected relative to the benchmark. The most critical factor determining the outcome would be how aggressively processors would compete. The presence of excess capacity would provide opportunities for short-term gains from aggressive competition, though the estimates of excess capacity provided to us by NMFS are quite modest. More importantly, the factors that can be expected to cause processors to refrain from aggressive competition would remain.

We doubt that processors would behave so aggressively that the situation would deteriorate, from their perspective, into the equivalent of a perfectly competitive market. Also, whatever degree of competition developed, the negative effects on processors would be offset by two factors, their effective ownership of IFQs through their PCVs, and the relative scarcity of fillet-producing capital. Nevertheless, similar to the case of ICVs under the AFA, there is a significant probability that processors would be adversely affected under the Dooley-Hall proposal. One possible amendment to the Dooley-Hall proposal that would reduce the probability of adverse effects on processors would be to impose restrictions on allowable increases in the share of total deliveries by each facility, or firm.

Another alternative that we evaluated would raise the limit on the amount of its deliveries that a cooperative could sell to a processor other than the one for which it was qualified. Raising this limit would facilitate rationalization under the AFA. Whether or not it would reduce the probability of adverse effects on ICVs would depend in part on whether they could exercise the transfer option without hindrance from processors. Determining the magnitude of the benefits to ICVs of increases in the transfer limit would require more information than currently available on the value of incremental supplies.

The third alternative is the elimination of the qualification requirement for cooperative membership, so that a catcher vessel could change processors without having to go through open access. There are several ambiguities concerning the interpretation of this proposal. The most important is whether it would apply only when a new cooperative agreement was signed, or every year. Under the former interpretation the proposed change would have little effect, whereas under the latter interpretation it could greatly enhance the bargaining power of ICVs, although not as much as the Dooley-Hall proposal. We also discuss two measures that would reduce, but not eliminate, the costs of going through open-access.

## I. Introduction

We have been requested to provide the Council a discussion paper that addresses the following objectives concerning the inshore sector catcher vessel cooperatives in the Bering Sea/Aleutian Islands (BSAI) pollock fisheries:

1. Provide information that will help determine if the implementation of inshore sector cooperatives for the BSAI pollock fishery, as provided for in the American Fisheries Act (AFA), is expected in aggregate to have beneficial or adverse effects on the independent vessel owners who, under the AFA, are eligible to participate in the BSAI pollock fishery. An independent vessel owner is an entity that owns fewer than three vessels in the BSAI pollock fishery.
2. Determine which, if any, of either the features of the AFA inshore cooperative rules or the characteristics of the inshore sector of the BSAI pollock fishery substantially increase the probability of adverse effects.
3. Determine the effects of three specific alternatives to mitigate any such adverse effects. In particular, determine the expected effects on the independent vessel owners, other vessel owners and pollock processors who are eligible to participate in the inshore sector of the BSAI pollock fishery.

The three alternatives to the current AFA rules for inshore sector cooperatives for the BSAI pollock fishery are:

1. Implement the Dooley-Hall (Independent Catcher Vessel Owners) proposal.
2. Replace the 10% limit on sales to another eligible inshore processor with a higher limit.
3. Eliminate the requirement that an eligible catcher vessel can only belong to a cooperative that will principally deliver its pollock apportionment to the inshore processor that received more of the pollock delivered by that catcher vessel than any other inshore processor in the previous year.

The current AFA rules for inshore cooperatives and the rules for each of the alternatives are described in Table 1.

Our analysis will use the tools of game theory, and more specifically of bargaining theory. Game theory is a powerful tool for the analysis of situations involving strategic interactions. However, it is important also to note its limitations. In particular, game theory can offer definitive predictions only if the “extensive form” of the game is well-defined (see, e.g., Fudenberg and Tirole 1991). The extensive form spells out all the rules of the game, all the possible moves by all the players, the information structure, and the timing and payoffs of each player for any possible scenario. Even a slight change in the extensive form of the game can lead to dramatic changes in the equilibrium outcome. Therefore, while our analysis should shed light on what *may* happen under various circumstances, it will not be able to offer definitive predictions about what *will* happen.

The first step in any game theoretical analysis is the identification of the participants, or players. In the inshore BSAI pollock fishery the major types of participants are the owners of independent catcher vessels (ICVs), processor-controlled catcher vessels (PCVs), and pollock processors. Because our analysis is restricted to the inshore BSAI pollock fishery, and does not include analysis of sideboard measures, we do not consider players from other fisheries.

Owners of ICVs are defined in the AFA as entities that own fewer than three vessels in the BSAI pollock fishery. However, for most analytical purposes it is more important to specify whether a vessel-owning entity is or is not a processor, rather than whether it owns more than two vessels. Therefore, unless specified otherwise, we will use the more inclusive definition that an ICV is any vessel owned by an entity other than an inshore processor. Similarly, unless specified otherwise, ICVs will be defined to include both those eligible in the inshore sector and those qualified in both the inshore and mothership sectors.

Processor-controlled catcher vessels are defined as vessels that are controlled by an inshore processor. The National Marine Fisheries Service (NMFS) has identified for us those vessels that are wholly or partially owned by processors. We recognize that ownership and control are two different things, but for purposes of data analysis we will necessarily have to use the NMFS list based on ownership as a proxy for the list of PCVs. This will probably result in overestimates of the numbers and aggregate catch shares of PCVs.

Consistent with the definition in the AFA, processors are defined in terms of facilities, rather than the entities owning them. The AFA eligible inshore processors, listed in descending order of deliveries to them in 1998, are Akutan, UniSea, Westward, Alyeska, Arctic Enterprise, Northern Victor, Sand Point, and Peter Pan. In addition, reference will sometimes be made to the entities owning the processing facilities. The three largest ownership entities are Trident Seafoods, which owns the Akutan, Arctic Enterprise, and Sand Point facilities, Maruha, which owns Westward and a majority interest in Alyeska, and Nippon Suisan, which owns UniSea.

There is heterogeneity among all three types of participants, with some being more efficient than others. Among both the ICVs and PCVs there are significant differences in catch histories, capacities, catching power, etc. Among processors there are plants of different ages, locations, product mix, etc.

The processing sector is concentrated, with the facilities currently belonging to Trident, Maruha, and Nippon Suisan processing over 90% of the pollock delivered in the inshore sector in 1998. In addition, Maruha and Nippon Suisan are Japanese firms with dominant positions in the Japanese surimi products market (NMFS 1999). In the harvesting sector, the vessels delivering to the Westward, Alyeska, and UniSea facilities have traditionally negotiated under the umbrella of the Bering Sea Marketing Association (BSMA), rather than as individuals. Therefore, we conclude that the perfectly competitive model, in which each participant takes price as given by the market, and does not pay attention to what others in the industry are doing, does not apply to this fishery. Rather, the participants are keenly aware of their mutual interdependence and therefore the relevant tools to use are taken from game theory. In particular, we will rely on insights developed by bargaining theory.

Bargaining theory deals with division of rent between game players. This is, in general, a complex issue, but there are some simple and key predictions that can be fruitfully applied. There is an axiomatic or cooperative bargaining theory developed by Nash (1953). The theory predicts that if all players are fully informed, they will negotiate an allocation that does not involve the waste of economic resources and that is biased towards the party with the better or stronger “outside option.” The outside option, or “threat point,”

is defined as the outcome that a participant can obtain if negotiation breaks down. This theory does not spell out the exact game played by players that leads to the predicted outcome. There is also a non-cooperative theory of bargaining (e.g., Osborne and Rubinstein 1990) that pays detailed attention to the exact game form and tries to predict choices by players. This theory also predicts that economic resources will not be wasted and the outcome will be biased towards the player with the better outside option.

However, if there is asymmetric information between players, so that not all players have the same information available to them, then both cooperative and non-cooperative bargaining theory predicts some waste of economic resources. For example, if everyone knows the size of the rent to be divided, as well as each other's outside options, then no one can gain by prolonging negotiations. On the other hand, if outside options are only known privately by each party, a party may reject offers repeatedly in order to signal that it has a strong outside option and this is wasteful because delay is costly.

Delay is just one example of wasting economic resources; the key point is that resources have to be used to signal, which is a cost incurred due to asymmetric information. Since parties with private information have incentives to mislead those who do not have this information, only actions that are costly can credibly convey information. Everyone will want to claim the strongest outside option, so less informed parties will start with a low offer to force better informed parties to reveal their outside option by rejecting offers. The stronger the outside option, the more they are able and willing to wait. Private information will also bias the final outcome towards the better-informed players.

The presence of asymmetric information also implies that the economic efficiency of the outcome will be determined by the rules of the game. In other words, the choice of specific economic institutions can influence not only the distribution of the rent but also the total amount of rent that is created. This means that the AFA, and the final choice of rules governing the cooperatives, will influence the efficiency of the BSAI fishery as well as the distribution of its rents.

The first objective of our analysis is to examine if the implementation of inshore sector cooperatives for the BSAI pollock fishery under the AFA rules is expected in aggregate to have beneficial or adverse effects on independent vessel owners. We have been instructed that the benchmark to use in evaluating this issue is the AFA without provision for cooperatives. This corresponds to an open-access fishery in which the other provisions of the AFA would apply. This is different from what may be observed under the AFA in 1999, even though there are currently no cooperatives, because the anticipation of cooperatives beginning next year affects incentives this year. For example, given the AFA rules for qualification for a cooperative, deliveries this year affect cooperative membership next year, and this would be expected to affect the distribution of deliveries this year.

Currently, fishing occurs under conditions of a race. If the race for fish stops as a result of the creation of cooperatives, rents will be created whose division among the players is to be analyzed. Briefly, anticipated benefits in processing include improved product quality and product mix, ability to respond to changes in demand, higher recovery rates, and lower cost due to rationalization through the retirement of less efficient capacity. In the harvesting sector, benefits include the ability of vessels to wait for the best periods to harvest fish, search out optimally sized fish, enhance the scheduling of deliveries, and reduce costs by idling less efficient vessels.

While the AFA without cooperatives is the benchmark, it is generally not the outside option for the players. That is, if bargaining over the formation of a cooperative collapses, the result would be equivalent to the benchmark only if not a single cooperative could be formed with processors. Defining the outside

option is not an easy task. To illustrate, suppose for simplicity there were only two processors with qualified fleets. Each fleet is supposed to form a cooperative, with the ICVs individually or collectively negotiating terms with its processor. If this negotiation breaks down, an ICV's outside option is to go to open access for a year. The payoff from open access depends upon who else is in open access. If only a single ICV decided to go into open access, its AFA allocation based on its catch history would effectively give it a quota for that year. At the other extreme, if both cooperatives failed to form, all vessels would be in open access and fishing under conditions of a race.

Thus the payoff for an ICV is very different depending on the particular configuration of vessels in open access in a given year, and therefore its outside option depends upon what is happening in the entire industry. This makes our overall task difficult. The outcome of bargaining mainly depends upon the value of one's outside option, and this is difficult to determine in this case. We will devote a considerable amount of the analysis to trying to determine plausible scenarios under open access and evaluate their effects on the ICVs. This analysis will also shed light on the outside options for the processors.

As discussed above, the presence of asymmetric information is also an important determinant of the outcomes of bargaining. Because it is common for processors to own vessels, but not for ICVs to own processing capacity, it can be assumed that processors negotiate from an advantage with respect to asymmetric information. That is, processors can be expected to know more about the costs and other conditions of harvesting than ICVs know about the costs and other conditions of processing. Also, the ownership of catcher vessels by processors may imply that ICVs need processors more than the processors need ICVs. On the other hand, because ICVs can legally negotiate price jointly through marketing associations such as the BSMA, while the processors cannot, ICVs enjoy an advantage as well.

Our initial task is to compare plausible scenarios under the AFA provisions for cooperatives with the expected outcomes under the benchmark, which is defined as the AFA with no cooperatives, in order to explore potential adverse effects of the AFA cooperatives on ICVs. Section II evaluates plausible outcomes in the benchmark case, and Section III evaluates outcomes under the AFA cooperatives.

Section III also addresses our second task of investigating the effects on the outcomes of specific features of the AFA cooperative rules and economic characteristics of the fishery. Issues considered include the cost of open-access, the negotiating framework, the role of processor-controlled catcher vessels, the requirement that 80% of qualified catcher vessels join the cooperative, the 10% transfer of harvest rule, and the timeframe of the AFA. Section IV evaluates the expected effects on the participants in the fishery of the three proposed alternatives to AFA cooperatives. In both Sections III and IV our analysis attempts to determine situations that are particularly problematic, and to assist the identification of policy options to mitigate adverse effects.

Professor Steven T. Buccola of Oregon State University has served as a consultant to this project concerning the lessons to be learned from the experience of agricultural cooperatives. In addition to being a valuable resource for us, he is the author of the report on agricultural marketing and bargaining cooperatives in Appendix A.

We have benefitted greatly from discussions with participants in the inshore fishery and other interested parties. Appendix B lists the individuals with whom we have discussed our research, usually at length, and sometimes on more than one occasion. We are very grateful for their help, while retaining full responsibility for the analysis and conclusions contained in this paper.



## **II. Benchmark: The AFA without Cooperatives**

In the, hypothetical, benchmark case of the AFA without provision for cooperatives, the race for fish would continue and therefore the potential benefits from rationalizing the fishery would not be obtained. However, the inshore sector would benefit from the AFA because of the increase in its share of TAC from 32.375% to 42.5%. For a given amount of TAC, this corresponds to an increase of almost one-third in the inshore sector's allowable catch. The NMFS has informed us that the total BSAI TAC is expected to be about one million metric tons for the next few years. Therefore, the increase in the inshore sector's allowable catch as a result of the AFA amounts to about 100,000 metric tons per year.

The benefits from the increase in allowable catch is partially offset by the requirement to repay a loan of \$70 million through a tax of 0.6 cents per pound of fish harvested. This can be thought of as the cost at which the inshore sector acquired pollock quota from the offshore sector. With a TAC of one million metric tons, the inshore sector's allowable catch would be 425,000 metric tons. The tax per metric ton is \$13.23, so the total annual amount paid would be \$5.6 million. Dividing this by 100,000 metric tons yields an effective annual cost per ton of \$56 per ton. We have been told that the rental prices for CDQs and offshore catcher vessel allocations suggest market values of \$250-\$300 per ton per year. If these reported values are even approximately comparable to values in the inshore sector, the benefit to the inshore sector of the increase in total allowable catch was much greater than the cost imposed in the form of the tax. The distribution of this net gain between individual participants in the fishery will depend on their relative bargaining power.

In the benchmark case, no restrictions would be placed on ICVs moving between processors. However, little actual movement would be expected compared to the situation at the beginning of the 1999 season, because the existing distribution of vessels among processors represents an equilibrium reached after a long term relationship between processors and catcher vessels. Consistent with the economic principle that opportunities for large gains will not be left unexploited, if catcher vessels could have made large gains by switching between processors, they would presumably already have done so.

This conclusion is strengthened by considering the available information on actual behavior in 1999. As noted earlier, the actual situation this year is different from the benchmark, because in the benchmark there is no expectation of cooperatives whereas in the actual situation this year the players expect cooperatives to be available beginning next year. Because the distribution of ICVs among processor cooperatives in the future will depend on deliveries this year, there is more incentive in the actual situation than in the benchmark for changes in fleet composition. However, the limited information available indicates that there has in fact been relatively little movement.

One reason that the distribution of vessels among processors has been quite stable historically is that processing capacity constraints under the race for fish have made it difficult for one processor to compete away a boat from another processor, even if it wanted to. In addition, there may be self-imposed constraints on the degree of competition among processors. Recognizing the effects of increasing capacity on each other and the race, oligopoly theory implies that processors will not expand capacity as much as in a fully competitive environment.

The processing sector is very concentrated, with the top three companies processing more than 90% of the total inshore harvest, and entry in the inshore sector is legally blocked by the AFA. The situation in the inshore fishery is a classic example of a repeated game. Processors should anticipate that aggressive tactics that give them short-term gains might not be profitable in the long run as each can

engage in such tactics. Therefore, the bidding for ICVs to switch processors might not be very aggressive. The processors would not have to be colluding, merely behaving non-myopically. They would just have to recognize that in the long run aggressive strategies would not be likely to pay. Their desire to behave this way would be enhanced by the restrictions that capacity constraints place on their available opportunities in the short run. The capacity constraints, in turn, would be more severe in the benchmark case than in the case of cooperatives.

Aggressive bidding over CVs may occur if a processor thinks it can eliminate a rival by bidding CVs away from it. Such a tactic will be profitable only if a processor believes it has significant advantage over a rival that it has targeted. There are at least two reasons why such tactics may not be pursued in the current AFA. The big three companies do not seem to have significant advantages over each other. One of them could target one of the smaller companies, but given their relative size, outright purchase should be the preferred tactic, rather than risk destabilizing the industry by aggressive bidding over CVs. The big three will also be concerned about “excessive market shares” and the temporal nature of AFA. Current expansion can backfire in the future if the Council perceives that any single entity has “over expanded”. Therefore, we do not expect much aggressive bidding over ICVs

The ex-vessel price in the benchmark case would depend on the bargaining power of the processors and the catcher vessels, which would be essentially the same as in the pre-AFA fishery. It is not easy to determine with confidence the actual distribution of bargaining power. On the one hand, the processors have better information than the independent catcher vessels because they also own boats and know the costs structure of the harvesting sector. The independent catcher vessels have imperfect information about the cost structure of the processors. This gives a major advantage to the processors.

On the other hand, independent catcher vessels can legally bargain as one group. Currently, many of the ICVs are grouped, together with some PCVs, in the BSMA, which negotiates prices for them. Since the processors are not legally authorized to form a bargaining group, this situation gives an advantage to the ICVs. However, the effectiveness of a main instrument of negotiation for the BSMA, refusing to harvest fish (striking), is undermined by the behavior of processing facilities whose fleets do not negotiate through the BSMA. In particular, Trident’s fleet includes a large proportion of PCVs, and Trident was able to convince its fleet to fish during the 1999 A-Season strike, making prolongation of the strike prohibitively costly to the members of the BSMA.

More importantly, the same factors that would be expected to reduce competition among processors for ICVs would be expected to affect the processors’ bargaining power with respect to price. That is, given the race for fish, which would continue under the benchmark case, competition between processors is limited by their capacity. Processors can generally take substantially more fish from a particular ICV only if they waive fish from other catcher vessels, which severely limits the ability of the ICVs to play processors against each other. In addition, non-myopic behavior among processors would attenuate the aggressiveness with which they compete.

Some analysts have gone further to argue that the processing sector is effectively a monopsonist, with one important component of the argument being the dominant position of Maruha and Nippon Suisan in the main market for surimi products (e.g., Wilen 1998). If this view is correct, the rents in the fishery before AFA, as well as in the benchmark case, would essentially all accrue to the processors

Another view accepts the conclusion that the processing sector is monopsonistic, but concludes in addition that the BSMA represents a countervailing monopolistic harvesting sector, resulting in the fishery

being a bilateral monopoly (Matulich and Sever 1999). Unlike the pure monopsony case, the bilateral monopoly case does not lead directly to any specific conclusions concerning the relative distribution of rents in the benchmark case. Instead, it implies that the distribution of rents would be determined by the two sides' relative bargaining power.

For the reasons discussed in the introduction, we take a more modest view concerning our ability to determine the actual degrees of market and bargaining power. We do believe that the capacity constraints under a race for fish, as in the benchmark case, give the processors a substantial amount of bargaining power. In combination with non-myopic behavior by the processors in what is a repeated game, the result may be a non-cooperative equilibrium that gives them a result close to what they could have obtained in an equilibrium involving cooperation. In other words, in the benchmark case processors might be able to do almost as well as if they were in fact a monopsony.

We stress that we are not predicting that this would be the outcome in the benchmark case, only that it is one possibility. The amount of competition among processors could in fact fall anywhere along a continuum from very little to very much. In our discussion of the possible outcomes under the AFA cooperatives, as well as under cooperatives operating under alternative sets of rules, we will take as our base case the existence of moderate competition among processors. However, we will also indicate how our conclusions would be altered under other degrees of competition.

A final point to be made about the benchmark case is that it is of limited usefulness in evaluating the effects of the proposed AFA cooperatives on ICVs. The benchmark case is counterfactual in that it allows for the effects of the AFA on allowable catch but not on the race for fish. The, hypothetical, continuation of the race for fish implies both that none of the rationalization benefits of the AFA are obtained, nor that the processors' bargaining power due to capacity constraints is reduced. Therefore, if it were concluded that ICVs were no worse off under AFA co-operatives than under the benchmark, this would be consistent with a situation in which the ICVs got no share of the benefits to be created by the AFA inshore cooperatives.

### **III. AFA Cooperatives**

The AFA allows for the formation of inshore catcher vessel cooperatives according to the rules summarized in Table 1. The membership in the cooperative for each processor is limited to the vessels that are qualified for that processor, where qualification is determined on the basis of the processor to which the vessel delivered the largest share of its total catch in the prior year. Vessels that are eligible to participate in the inshore sector and do not belong to a cooperative can fish under open access conditions for the share of the total inshore allocation not apportioned to the cooperatives.

A vessel fishing in the open-access inshore fishery will qualify for membership the following year in the cooperative, if any, associated with the processor to which it delivers the largest share of its fish. Under the AFA rules, it will not be possible for a vessel to leave one cooperative to join another without first spending a year in open-access to qualify for the new cooperative.

Thus open access is the outside option, or threat point, for an ICV qualified for a particular cooperative. Accordingly, it is a potentially crucial element of its bargaining power. Therefore, before examining other aspects of the AFA cooperative rules, we will first investigate the possible outcomes under open access. We will do this by considering several alternative open-access scenarios, including some that are unlikely to be equilibrium outcomes.

#### **A. Open Access**

Two issues relevant to each scenario, although not equally important in all, are the aggregate amount of fish available to catcher vessels (CVs) in open access relative to their aggregate catch histories, and the catch history of individual CVs relative to their catching power.

The aggregate amount of fish available under open access conditions will equal the share of the total inshore allocation not apportioned to the cooperatives. Therefore it will include the shares of the allowable catch assigned to each CV in open access on the basis of its catch history plus some additional amounts. One source of additional allowable catch in the open-access fishery is the share of non-eligible CVs. NMFS informs us that this would amount to about 2000 metric tons. In addition, there could be up to another 2000 metric tons from the shares of CVs that are eligible but do not participate or could be eligible but do not apply.

The AFA's estimated catch history shares for individual CVs are based on their best two years' history during the three years 1995 to 1997. In some cases, CVs' catch histories are not commensurate with their catching power. For example, a large CV (Alaska Command, ADFG# 57321) began operating in the BSAI inshore sector only in mid-1997 and therefore its catch history calculation is based on one partial year's catch. The following year its share of the total catch was more than six times as large as its catch history share. Therefore this vessel is under-vested, in the sense that its relative allocation of catch under the AFA is substantially less than its relative catching power. For under-vested CVs, the quantity of fish that could be caught in open access would exceed the quantity that it would bring into a cooperative's allocation.

The first scenario we consider is the extreme case in which every eligible CV is in open access. This is unlikely to be an equilibrium outcome, but is one possible outcome for next year if all cooperative negotiations broke down. The situation would be similar to the 1999 conditions. All CVs would be free to choose their processors, subject to the processor's willingness to accept their deliveries and subject to

existing delivery contracts. Strategic movement between processors might take place, to the extent that they had not already occurred in 1999. Most CVs would be expected to harvest an amount of fish similar to their catch history. The additional amounts of allowable catch available in open access would be too small to have any significant positive effect at the aggregate level. The adverse effects on fully-vested CVs of having under-vested CVs harvest more than their catch histories would be more substantial in aggregate, but the effect on any one CV would not be large with all CVs in open access. The ex-vessel price would most likely be determined by a process similar to that in 1999.

In short, except for the possibility of strategic movements between processors because of the prospect that cooperatives might be formed in the subsequent year, the situation would be very similar to the benchmark case. ICVs would essentially be no better or worse off in aggregate than in the benchmark. The inshore sector as a whole would benefit from the larger allocation of TAC than in the pre-AFA fishery, but would fail to realize the potential benefits from rationalization under the AFA.

Consider now the opposite extreme, with every eligible CV in a cooperative. In this case, if one, and only one, fully-vested CV went into open access it would do very well. It would bring its own catch history with it, and in addition have access to the additional amounts that were not apportioned to the cooperatives. Because it would be the only CV there would be no race. It would be as if this one CV had been granted an individual vessel quota (IVQ) for the year in an amount some 4000 metric tons greater than its catch history. Furthermore, because it would be the only source of incremental fish to the processors, it could probably negotiate a higher price for its fish than it would receive as a member of a cooperative. Not only would there be no cost to having to go through open access to change cooperatives, open access would be so desirable there would be no incentive to join a cooperative.

Of course, the very fact that this situation would be so attractive implies that it would not be an equilibrium solution, because other CVs would enter open access. Therefore we next consider intermediate scenarios in which some CVs are in cooperatives while others are in open access.

If all CVs in open access were fully-vested, they would generally be able to harvest amounts of fish similar to their catch histories because they would be in a race only against others whose catch histories were commensurate with their catching power. However, they would not benefit from the rationalization gains possible from avoiding having to race. Their relative position with respect to ex-vessel price is unclear. Their ability to supply fish when most valued by the processors would be constrained by the need to race, but they might benefit from being the incremental suppliers.

However, an open access fishery comprising only fully-vested CVs is unlikely to be an equilibrium solution, because under-vested CVs would find entry to be attractive in order to exploit the catch history of the fully vested CVs. The magnitude of the adverse effects on individual fully-vested CVs would increase with the ratio of under-vested CVs to fully-vested CVs in open access. If this ratio were high, the cost to a fully-vested CV of switching processors by going through open-access could be very high.

Now, suppose that the CVs in open access were all qualified for the same processor. This would be the case if all other CVs joined the cooperatives for which they were qualified, but the cooperative for the one processor in question failed to form because of a breakdown of negotiations. If one or more of the CVs that were qualified for that processor were substantially under-vested, the other CVs qualified for that processor could find the open-access situation to be very costly. In fact, the cost could be great enough for them to be willing to make large concessions so that the cooperative could form and they could avoid being forced into open access. Similarly, if all cooperatives were formed, with almost all CVs in them, an

individual ICV might find it tempting to switch to another processor by going through open access. But if its current processor controlled one or more substantially under-vested CVs, it could threaten to send them into open access as well in order to make open-access prohibitively costly to the would be switcher.

We know of one study that estimated the cost of open access for a particular ICV whose owner feared that he might find himself in a situation similar to this scenario. The results indicated that the cost would in fact be prohibitive, with the ICV able to harvest only about one-half of its catch history. We do not rely on these specific results in our analysis, because some of the assumptions used in the study now appear incorrect. For example, current estimates of the amount of extra catch history in open access are much smaller than assumed in the study. However, the study does illustrate the possibility of obtaining quantitative estimates of the costs of open access under specified scenarios, and further research of this type would be worthwhile.

A difficult question to answer is which equilibrium is most likely. There are two principal candidates. Either a large number of CVs are in open access so that under-vested CVs cannot hurt the fully-vested CVs too much, or only under-vested CVs are in open access. The first case seems unlikely. Indeed, if the co-ops are designed effectively, fully-vested CVs should find it profitable to join them. The second case is more likely, but it is still difficult to determine how many under-vested CVs would be in open access. In theory, their number should be such that the last CV to join should be indifferent between joining a cooperative or staying in open access. We conclude that the most likely open access would consist of under-vested CVs, and in such an equilibrium a fully-vested CV spending a year in open access in order to change processors could incur a severe penalty in terms of not being able to catch an amount of fish similar to its catch history.

While investigation of these various open-access scenarios has been necessarily speculative, it does indicate that an ICV could get seriously hurt in an open-access year. This is a crucial consideration in evaluating the bargaining power of an ICV inside an AFA cooperative, because the open-access year represents its threat point. In other words, if an independent CV can get hurt in open-access, it can also get hurt in a cooperative.

## **B. Negotiations**

Implementation of cooperatives under the AFA will require, for each processing facility, negotiation among the qualified CVs over the formation of a cooperative, an agreement with the processor to process the cooperative's pollock, and a mechanism for negotiating ex-vessel prices.

Formation of a cooperative requires the approval of 80% of the qualified CVs ("the 80% rule"). The potential members of a cooperative would have to agree concerning both the governance structure of the cooperative, as contained in its bylaws, and its operational procedures, as contained in a membership agreement. We will not discuss governance issues, other than to note that the choice of rules concerning voting is an important issue. Professor Buccola's report, Appendix A, discusses the choice of voting rules in agricultural cooperatives.

Issues to be negotiated concerning the membership agreement include the initial distribution of the cooperative's pollock harvest allocation among individual members, rules for subsequent transfers of pollock harvest allocation among members, allocations and rules concerning other species, monitoring and enforcement procedures, and, most importantly, the duration of the cooperative and rules governing the withdrawal of individual members.

The membership agreement will have to meet NMFS requirements for monitoring and other provisions related to satisfaction of regulations concerning sideboards, PSC, etc. In order to avoid contention, and to satisfy the AFA's requirements with respect to "same terms and conditions," the initial distribution of the cooperative's annual pollock allocation among individual members is expected to be proportional to their annual catch histories, with the catch histories being determined according to NMFS regulations. However, it is not clear whether the intra-year distribution of allocation, e.g., between A-Season and B-Season, would be proportional to the intra-year distribution of each member's catch history, or have the same percentages apply for all members. The latter approach would be simpler, but would involve a reallocation of the value of catch history among members to the extent that they had harvested differing proportions of their catch histories in different seasons.

Implementation of a cooperative would make possible the redistribution of pollock harvest allocations among its members. We expect that a cooperative's membership agreement will allow its members to transfer harvest allocations among themselves as they wish, subject to operational requirements for the processors, which could influence the transfers made. The resulting rationalization in the harvesting sector, with harvest allocations moving from less efficient to more efficient vessels within a cooperative, is a major economic benefit of the cooperative structure. Further rationalization benefits could be obtained if harvest allocations could be transferred between cooperatives, as well as within them. However, under the AFA rules this would be difficult once the cooperatives are implemented, because it would require that the vessel holding the allocation to be transferred go through open access in order to qualify for the new cooperative.

The duration of a cooperative under the AFA could be a specified amount of time, from one to five years, with five years being the remaining duration of the AFA, or it could be for an indefinite period, remaining valid until terminated by its members or by an event such as the termination of specific portions of the AFA. There are significant potential advantages to both processors and CVs from having the planned duration of a cooperative be substantially more than one year in length. Moreover, the expectation of a multiple-year duration for a cooperative is consistent with our understanding of on-going negotiations in the inshore pollock fishery.

However, multiple-year cooperative agreements could be difficult in the case of AFA. A crucial feature of AFA cooperatives is that they are tightly linked to a single processor. It is true that the membership agreement is a contract between the members of the cooperative, and the processor is not formally a party to the negotiations. However, because the processor must agree to process the cooperative's pollock in order for the cooperative to be formed, it will presumably be consulted to ensure that the terms and conditions of the agreement, such as its duration, are acceptable. The agreement to process is therefore closely related to the membership agreement and will contain clauses concerning issues such as quality and adherence to harvesting schedules. Moreover, if PCVs are allowed to be part of the cooperatives, as we have been instructed to assume, processors could influence the membership agreements directly, with the potential influence increasing with the relative importance of PCVs in the qualified fleet.

This close dependence of the cooperative and the processor makes it difficult to sustain a multiple-year cooperative agreement. From the point of view of an ICV, a multiple-year cooperative agreement would be unsuitable without a corresponding multiple-year price agreement. Joining an AFA cooperative would commit its fish to a single processor (we ignore for the moment the 10% rule), and without a corresponding agreement on the price to be received, it could be placing itself in a difficult bargaining position by signing the cooperative contract. Similarly, a processor would be reluctant to commit to a long-

term purchasing agreement without a corresponding agreement on price, because doing so might make it vulnerable to supply disruptions. Other things equal, a processor's vulnerability to supply disruptions would be greater the smaller the role of PCVs in its cooperative.

Unfortunately, the large variability in production and demand conditions appear to make long-term fixed price agreements impracticable, and our interviews with participants in the fishery indicate that this is the general consensus among them as well. Several participants have expressed the view that some form of profit or revenue sharing mechanism might make longer-term price agreements possible, but others have expressed serious reservations as to their practicability. As discussed in Appendix A, most agricultural bargaining associations negotiate prices for a single harvest season, including many that had previously experimented with price formulas but found them to be impracticable. As in the case of agricultural cooperatives, the two main reasons that profit or revenue sharing formulas are likely to be impracticable in AFA cooperatives are the asymmetric information between the processors and the ICVs regarding the processors' costs, and the possible use of "creative accounting" by the processors. This second problem can be particularly serious when a processor is vertically integrated with the downstream market, as some pollock processors are.

One possible approach to mitigating the problems from having cooperative agreements that are longer term than price agreements is to allow for members to withdraw from the cooperative agreement. We expect that the cooperative agreements will include withdrawal clauses, but that members will not be able to withdraw more frequently than annually. If a cooperative member could withdraw annually without any penalty, the multiple-year cooperative contract would not be much more than an annual contract. But it is conceivable that restrictive conditions could be imposed on a CV contemplating withdrawal, making it too costly. Also, under the AFA, withdrawal to transfer to a different cooperative would involve the cost of going through open access.

If such costs did not exist, withdrawal might occur easily, but then a different problem might arise that requires legal clarification. If withdrawals resulted in less than 80% of a processor's qualified CVs remaining in its cooperative, would the cooperative continue to legally exist? This is an important issue. If it turns out that a cooperative continues to legally exist even if more than 20% of qualified vessels leave after the first year, the ICVs would lose a considerable amount of market power after that first year.

If the membership agreement allowed for withdrawal on an annual basis, and if the deadline for withdrawal were later than the date at which the results of the price negotiation were known, then a CV might go into open access in the coming year in order to qualify for a different processor in the following year. As discussed in the previous section, the costs of being in open access for a year can be expected to be substantial for a fully-vested CV. Therefore the feasibility of this approach will depend on how much better an ICV could do by switching processors, which in turn depends on how aggressively processors are willing to bid for ICVs. Given the existence of excess capacity with the ending of the race for fish, we expect processors to behave more competitively than in the benchmark case, but long-term considerations in what is a repeated game might still restrain them from competing very aggressively for market share.

If withdrawing from a cooperative were not a practical option for ICVs that were unhappy about the results of a price negotiation, the possible actions available to them may not be effective in improving their position. One possibility would be to go on strike. However, if the processor obtains a large share of its deliveries from its own PCVs, it could keep them fishing and simply reschedule deliveries from the striking ICVs until later in the season, so that the striking vessels would incur costs beginning immediately but the processor would not.



Another possibility for the owner of an ICV who found himself involved in a long-term supply commitment with unfavorable ex-vessel prices would be to sell the vessel and its associated harvest allocation. But, unless the vessel went through an open-access year, it would have to remain with the cooperative for which it was already qualified. Since the annual value of a unit of harvest allocation to an ICV in a cooperative is the ex-vessel price net of catching cost, an unfavorable ex-vessel price would imply an unfavorable price for the vessel's harvest allocation. Therefore only a processor might find it profitable to buy such a vessel. An additional benefit to a processor of buying a vessel is that doing so would increase the potential influence of PCVs relative to ICVs in the cooperative.

### **C. Processor-controlled Catcher Vessels**

Two measures of PCV participation in a cooperative are potentially relevant: the percentage of the cooperative's total number of vessels that are PCVs, and the percentage of the cooperative's total deliveries that are accounted for by PCVs. The first measure is relevant to any issues involving voting for which the voting rule assigns one vote to each vessel, as is implicitly the case in the 80% rule, and would also be the case for electoral decisions in a cooperative choosing a one-vessel, one-vote rule. The second measure is relevant to issues such as the effectiveness of strikes, because it indicates the extent to which a processor would have to rely on ICVs for its supplies of fish, and would also be relevant for electoral decisions in a cooperative that based its allocation of votes on relative harvest allocations.

Because the participation of PCVs in cooperatives is important in these and other contexts, we have used 1998 data to try to obtain estimates of what the AFA cooperatives might look like. First we determined which processor each CV would qualify for, if the qualification were to be based on 1998 data. Of course, the actual membership of each cooperative will be based on 1999, not 1998, deliveries, and we are aware of some specific instances in which the processor for which a CV is qualified is different from that implied by the 1998 data. However, without complete data for 1999, the 1998 data provide the most recent, internally consistent, data on this issue.

We then assigned the NMFS allocation share for each CV to the processor for which it would be qualified, in order to determine the share of total assigned allocations for which the, hypothetical, cooperative for each processor would account. The results are shown in the first two columns of Table 3 for both individual facilities ranked in descending order of share, and for the cumulative shares of these facilities. The largest six cooperatives would account for 98.2% of the total assigned allocations. The bottom half of the table aggregates the data to the level of companies, with the cooperatives owned by the four largest companies accounting for 98.6% of the total assigned allocations. Note that the figures shown here are shares of assigned allocation, and therefore differ somewhat from the shares of actual 1998 deliveries that are reported in Section I.

We attempted to identify PCVs by assuming they corresponded to the processor-owned vessels identified by NMFS. As noted in the introduction, we recognize that some vessels identified as involving processor ownership may not be controlled by processors. Although it is also possible that some CVs that are not identified as processor-owned are in fact processor-controlled, we believe that the net effect of using processor ownership as a proxy for processor control is to over-estimate the numbers and aggregate catch shares of PCVs. Also, given the use of proxy data, comparisons across processors may not accurately reflect the relative importance of PCVs to them.

Keeping these caveats in mind, the final two columns of the table show, respectively, PCVs as a percent of each hypothetical cooperative's total catcher vessels, and their share of each cooperative's total

allocation. The data indicate that, except for one company, PCVs would account for a large share both of the total membership of the cooperative and of the total deliveries to the processor. The results with respect to companies are similar. So most processors appear to be in a very good bargaining position, with the one notable exception. Only one cooperative could be formed with PCVs alone.

The bottom line of Table 3 shows the shares of PCVs aggregated to the total industry level. The share of PCVs in the total inshore fleet is of interest because it indicates the extent to which processors would be the direct beneficiaries of rationalization in harvesting. Also, because processors would reallocate harvest allocations among their CVs under conditions of full information, the results would be expected to be fully efficient, whereas ICVs would reallocate harvest allocations under conditions of asymmetric information and therefore full efficiency would not be reached (Myerson and Satterthwaite 1983).

The share of PCVs in the total assigned allocations is of interest in evaluating the aggregate welfare effects of policies affecting the distribution of net benefits between processors and catcher vessels. Other things equal, the greater the share of PCVs in total deliveries, the smaller is the effect on processors' total profits of a redistribution of benefits in favor of catcher vessels.

#### **D. The 80% Rule**

The AFA requires that a contract implementing an inshore cooperative must be signed by the owners of 80% or more of the vessels qualified for that processor. This is equivalent to requiring a vote on whether a cooperative should be implemented, with at least 80% of the votes in favor being required for passage. The implications of this rule can be analyzed using the theory of the optimal majority (Buchanan and Tullock 1962).

Increasing the percent of votes required for approval of an issue has both benefits and costs to those potentially affected by the outcome. The main benefit is that as the percent is increased, the probability of any one type of participant being affected by an adverse outcome is reduced. In the extreme, requiring 100% approval, i.e., a unanimity voting rule, would eliminate the possibility of any voter being adversely affected, because anyone who would be hurt by passage could block it with a negative vote. In effect, a unanimity rule gives each individual voter veto power over the issue in question. As the required percent approval decreases below 100%, the percent of individuals who would have to vote negatively to block passage increases. This increases the probability of some participants being hurt by adverse outcomes, as well as the number of individuals who might be on the losing side.

The cost of increasing the percent of votes required for approval of an issue is that it increases the costs of reaching agreement. Under a unanimity rule, negotiations would have to occur until every individual voter agreed to a proposal. This would not only be time consuming, but would also involve strategic behavior by individuals as they sought to take advantage of the leverage that their veto power gave them. In fact, the difficulty of reaching agreement might be so great that no proposals could pass. As the percent approval required decreases, the costs of reaching agreement decrease, and the probability of passing proposals increases.

Because participants will differ with respect to their potential gains or losses from various types of issues, they will also differ with respect to the optimal choice of voting rule. In considering the AFA provisions for cooperatives, it is not possible to determine in general how changing the 80% required

approval to a higher or lower percent would affect the participants. However, the following observations should be noted.

First, there is a clear and important difference in one aspect of the benefits and costs to processors and ICVs. As the percent approval increases, the costs of reaching agreement increase for both processors and ICVs. However, the benefits in terms of reducing the probability of adverse decisions increase only for ICVs, because the processor already has veto power by the requirement that it agree to process the cooperative's fish.

On the other hand, differences between processors and ICVs in the rate at which costs increase with the required percent approval could more than offset the difference in benefits. For example, if the number of catcher vessels qualified for a processor were relatively small, and included one or more substantially under-vested PCVs, the costs to the processor of not being able to reach agreement could be much less than the cost to the qualified ICVs. The reason for this is that if agreement were not reached, all the CVs qualified for this processor would have to go into open access. As discussed in Section 3A, this open access scenario could be very costly for the ICVs that would have to compete against the under-vested PCVs.

It should be noted that the 80% rule allocates one vote to each CV. If a different allocation of votes had been used, the relative influence of different types of participants would have been affected. For example, one alternative would have been to base the allocation of votes on the quantity of catch history that a CV would bring into a cooperative. The data in Table 3 indicate that processors' vessels generally account for a larger percentage of catch history than of the number of vessels, implying that basing the allocation of votes on catch history would have increased the fraction of votes held by PCVs. Another effect of allocating votes on the basis of catch history would have been to reduce the fraction of votes held by small CVs.

#### **E. The 10% rule**

The AFA permits a cooperative to transfer up to 10% of its total pollock harvest to a different processor than the one for which it is qualified. The possibility of increasing the permitted transfer to more than 10% is one of the alternatives to the AFA rules that we consider later in this report. In this section, we consider some issues related to the rule as currently written.

If decisions on such transfers are entirely up to the cooperatives, without being subject to hindrance by their primary processors, then this rule will increase cooperative's bargaining power relative to a situation in which they had to deliver all of their harvest to the processor for which they were qualified. In addition, any such transfers that took place should increase the degree of rationalization in processing under the AFA, because the willingness to pay for fish would reflect the economic value of the fish to the bidder.

However, the ability of a cooperative to make transfers that are against the interests of its primary processor can not be taken for granted. For example, if the transfer could be made subject only to the approval of the processor's official in charge of scheduling deliveries, then the processor might be able to reduce or eliminate the advantage to the cooperative from making the transfer. Similarly, PCVs will presumably be allowed to vote on issues such as whether or not to transfer harvest (though not on the price at which it would be transferred) and could cast their votes in favor of the processor's interests, rather than the cooperative's.

The 10% rule could be of direct benefit to processing companies that own more than one processing facility, because it could make it possible to fine tune the allocation of deliveries between its own plants to reflect their relative efficiencies. This would again facilitate rationalization of processing under the AFA, but potentially not as much as transfers between processing firms. However, if cooperatives were effectively limited to transfers within processing companies they would receive relatively little benefit from the 10% rule.

While the AFA places specific limitations on the amount of transfers that could be initiated by a cooperative, it does not appear to place any limitations on the amount of a cooperative's harvest that could be transferred by a processor. In discussions with participants, we have heard the view expressed that such transfers would be essentially unlimited. If this is correct, a processor could have its cooperative deliver part or all of its harvest to one or more other processors, while retaining the benefit of any difference between the price it had to pay its cooperative and the amount that other processors would be willing to pay. Such transfers of harvest might result in substantially more rationalization of processing capacity than could otherwise be attained under the AFA, but the increased transparency of the resulting transfers of rents could also be a source of friction between processors and cooperatives.

## **F. Timeframe**

Rationalization in both the harvesting and processing sectors would benefit from a long timeframe for planning decisions. The AFA is scheduled to expire at the end of 2004. As players anticipate an end, a change, or a straight renewal of the AFA at the end of this period, their behavior will be affected. In other words, players will not behave as if the AFA had no end in sight. For instance, a player might not exploit all its market or bargaining power for fear of changes after 2004. This means that few long-term lessons can be learned from the experience of the first years of the AFA.

Also, less rationalization might take place if CVs and processors anticipate that the scheduled end of the AFA will imply a return to the race for fish. In this case, participants would want to retain more capacity than would otherwise be optimal.

Catcher vessels and processors might also decide to retain excess capacity for another reason. When bargaining for the cooperative and the price contracts, catcher vessels and processors know that in case an agreement is not reached by the deadline, they will be thrown back into a race for fish in the open-access part of the fishery. In that case, keeping excess capacity will make open-access more attractive and therefore improve the bargaining power in the cooperative and price negotiations.

## **IV. Alternatives to AFA Cooperatives**

### **A. The Dooley-Hall Proposal**

The Dooley-Hall proposal would modify or eliminate several of the AFA rules for inshore cooperatives. A list of the proposed changes is shown in Table 2. The most important proposed change is to eliminate the “qualification” requirements. A cooperative could deliver to any processor, and any eligible catcher vessel could join any cooperative. Elimination of the qualification requirements makes the 80% rule inoperable, and it is replaced by a rule requiring that the cooperative contract be signed by the owners of five or more catcher vessels.

Except for the requirement that CVs have to belong to a cooperative in order to obtain the advantages of pollock harvest allocations, the Dooley-Hall proposal would be equivalent to an individual fishing quota (IFQ) program. The cooperative requirement has some important practical implications for the management of the fishery, for example, with respect to monitoring and enforcement issues. However, for the purpose of evaluating the principal effects of the Dooley-Hall alternative on the different types of participants in the fishery, we can treat the proposal as if it were an IFQ program.

Therefore the evaluation of the Dooley-Hall proposal can be based on the considerable amount of theoretical and empirical information available on fishery management programs involving IFQs (see, e.g., National Research Council 1999). One basic finding is that IFQ programs score highly on efficiency grounds, allowing the creation of rents and facilitating rationalization in both the harvesting and processing sectors. However, rationalization generally involves losers as well as winners, and IFQ programs have been controversial with respect to their distributional effects.

We have been repeatedly informed by participants that the AFA rules for cooperatives were designed to avoid adverse effects of rationalization on processors. In addition, there is an apparent consensus that processors would be worse off, and ICVs better off, under the Dooley-Hall proposal than under the AFA cooperatives. However, there is sharp disagreement concerning the magnitude of the distributional effects. We have had representatives of processors tell us that both sides would gain under the AFA rules, whereas the processors would lose disastrously under the Dooley-Hall proposal, while representatives of ICVs have said that both sides would gain under the Dooley-Hall proposal, whereas ICVs would lose disastrously under the AFA rules.

We have heard coherent arguments in favor of both of these extreme positions. Our goal in this section is to analyze the economic determinants of different possible outcomes, and to evaluate the extent to which they are likely to be present in the inshore pollock fishery. In carrying out the analysis, we will assume for simplicity that the same total amount of wealth would be available for division under the AFA and Dooley-Hall rules. Thus we will ignore for the moment the probability that the efficiency gains under the Dooley-Hall proposal would be greater than under the AFA rules.

The basic change that the AFA made in the economic circumstances of the fishery is that catcher vessels will have a claim on the available harvest allocation based on their catch history. Historically, the lack of such a claim has been the primary incentive for the race to fish, and therefore the AFA is expected to decrease the daily rate of harvest and thereby extend harvesting periods. This in turn will create extra capacity in both the harvesting and processing sectors. The extent of excess capacity may be an important determinant of the degree of competitive behavior among processors. Other things equal, greater excess capacity will encourage more competition for fish.

Therefore the extent to which the AFA creates excess capacity will be another important factor in determining outcomes under the Dooley-Hall proposal. Although the AFA has eliminated the classic incentive for a race for fish, it appears that some incentives for a race to fish will remain. For example, we have been informed that the limited time period during which high quality roe is available during the A-Season, and increasing restrictions on fishing in the B-Season, will limit the reduction in the race for fish. These offsetting factors make it difficult to assess the extent of excess capacity that will be created.

Our discussions with participants yielded widely varying responses, with representatives of processors predicting much more excess capacity than representatives of ICVs. The NMFS gave us an intermediate response, informing us that there is sufficient excess capacity that the inshore TAC could be used fully even if three or four of the smaller processing facilities did not process BSAI pollock. Not having sufficient technical knowledge of the industry to form an independent opinion, we will rely on the NMFS estimate. Based on 1998 data on pollock deliveries, the three smallest processing facilities together processed about 10% of the total deliveries, while the four smallest together processed about 20%. Therefore we can assume that excess capacity is in the range of 10-20%.

The degree of competitive behavior among processors would be a critical factor in determining outcomes under the Dooley-Hall proposal. As discussed in Section II, the processing sector is very concentrated, and the situation in the inshore fishery is a classic example of a repeated game. Processors should anticipate that aggressive tactics that give them short-term gains might not be profitable in the long run as each can engage in such tactics. If the processors have similar costs, they could simply be satisfied with the status quo, and be able to retain rent by keeping their processing share constant. This would be accomplished not as a result of collusion but as a result of an optimal long-term equilibrium strategy of a non-cooperative game.

It is very doubtful that the above degree of excess capacity would blind processors to the long-run advantages to be gained from restraining their competitive instincts. Therefore, we would not expect the situation to deteriorate, from the processors' point of view, into the equivalent of a perfectly competitive market. Nevertheless, the competitive market outcome is not a logical impossibility, and therefore the outcomes under perfect competition should be examined.

This case has previously been considered by Matulich, Mittelhammer, and Reberte (1996) in the context of a race for fish that is ended by the introduction of IFQs. Their paper concludes that if processing capital is non-malleable, the ex-vessel price of fish will increase to the point where it is equal to the difference between final product price and short-run variable processing cost. Processors will leave the industry until excess capacity no longer exists. During the transitional period, catcher vessels not only gain all the rents from the fish, but also the quasi-rents from the processors' capital. Once a new equilibrium is established, the remaining processors earn a normal rate of return on capital.

However, this theoretical analysis cannot be applied straightforwardly to the BSAI pollock fishery. Even under the unlikely assumption that processors in such a highly concentrated fishery would not be able to do better than the perfectly competitive market outcomes, the results of this paper would exaggerate the negative effects on pollock processors of an IFQ, or Dooley-Hall, program. First, the model assumes that processors receive no IFQs. However, in the pollock fishery, processors own catcher vessels, which are being given harvest allocations on the same terms as the ICVs. To the extent that processors would be paying the higher prices for fish to their own vessels, except for higher crewshare payments the result would be merely an internal transfer, not an economic loss. Second, the model assumes that processing capital is homogeneous, so that excess aggregate capacity implies that all types of capital are in excess

supply. However, pollock processors produce two main types of primary product, surimi and fillets. Under current market conditions, fillet capital would not be in excess supply even if total excess capacity was substantially larger than assumed by NMFS. Therefore, fillet capital would continue to earn quasi-rents. The model's assumptions that processors could not earn informational rents, and that pollock processing capital has no alternative uses, are also too pessimistic.

Nevertheless, it is clear that if processors were unable to restrain themselves from cutthroat competition, the Dooley-Hall proposal could result in adverse results for them relative to the benchmark case. Therefore, in order to protect processors from the effects of such an adverse scenario, consideration might be given to putting some constraints on processor behavior. One possibility would be to impose restrictions on increases in the share of total deliveries processed by each facility, or firm. For example, a processor might be restricted from increasing its share more than X% from that in a base year, or alternatively, by more than Y% from that in the previous year. Such restrictions would impede the extent of rationalization in the processing sector, but not necessarily relative to that under the AFA cooperative rules.

## **B. Increase in the Transfer Limit**

Under the AFA rules, a cooperative contract may provide for up to 10% of the cooperative's pollock harvest to be processed by a different processor than the one for which it is qualified. One of the proposed alternatives that we have been asked to evaluate would increase the 10% to a larger, unspecified, figure, while retaining the remainder of the AFA rules unchanged.

As discussed in section III.E, the ability of a cooperative to benefit from a transfer rule depends on the extent that it could implement transfers if they were against the interests of its principal processor. If a processor can impede transfers through its role in the scheduling of deliveries, or through its influence over PCVs, the existing transfer rule would not be very effective in increasing a cooperative's bargaining power. Accordingly, increasing the limit on the percent that could be transferred would not be a significant improvement in the AFA rules from an ICV's perspective, although it might facilitate rationalization in processing. However, if the regulations implementing the AFA ensure that cooperatives are able to exercise the transfer option without hindrance from their processors, then the transfer rule does enhance the bargaining power of cooperatives, and increasing the limit could be of significant benefit to them.

Under the AFA rules, each processor is guaranteed at least 90% of its cooperative's deliveries. Therefore, the potential adverse consequences to them of aggressive competition over the transferable amounts would be much less than if their total supplies were potentially at stake. In addition, the amount subject to transfer is equivalent to an incremental supply of fish, the value of which to a processor is equal to the value of processed fish minus the variable cost of production. Therefore, processors would be expected to be willing to pay more for incremental supplies than for their base supplies, and this expectation is consistent with experience in the market for CDQs.

The data available to us are not adequate to estimate the value of incremental fish to inshore processors under the AFA, and therefore we will use a hypothetical example to illustrate the analysis. Suppose that the ex-vessel price under the AFA rules would be P dollars if there were no provision for a cooperative to transfer part of its harvest, and that the value to a processor of incremental supply were constant over the relevant range at 2.5P dollars. Then the provision allowing a cooperative to transfer 10% of its deliveries could increase its average ex-vessel price by up to 15% ( $.9 \times P + .1 \times 2.5P$ ) over what they would be without such a provision.

Similarly, under these illustrative conditions, each percentage point by which the transfer limit were raised could result in an increase in average revenue of up to 1.5%. However, the actual benefit would be less than this if the processors did not compete away the full net benefit to them of incremental supplies. Also, as the percent allowed to be transferred increases, the characterization of these amounts as incremental supplies would become less appropriate.

We emphasize that the numbers used in this example are purely hypothetical. We recommend that the Council conduct further research on the magnitude of the principal determinants of the value of incremental supply.

### **C. Eliminate the Qualification Requirement for Cooperative Membership**

Under the AFA rules, a cooperative contract must allow owners of other qualified catcher vessels to enter the cooperative, after the contract is filed but before fishing for the year begins, under the same terms and conditions as the qualified vessel owners who entered the contract when it was filed. One of the proposed alternatives that we have been asked to evaluate would eliminate the qualification requirement for vessels entering a contract after it is filed, while retaining the remainder of the AFA rules unchanged.

The intention of this proposed change in the AFA rules was to allow CVs to change processors without going through an open-access year. Because the open-access requirement is potentially very costly to a catcher vessel, eliminating it would help ICVs by increasing their bargaining power. However, there is considerable ambiguity about the interpretation of the proposed rule change, and about its compatibility with other aspects of the AFA rules.

The original rule made it mandatory for cooperatives to allow qualified CVs to enter under the same terms and conditions as the original members. The same wording is carried over into the new rule, but now the class of CVs that would have to be allowed to enter is broadened to include all eligible CVs, not just qualified CVs. Therefore, it would be possible that a cooperative could suddenly be faced with a large influx of new members. This could create serious difficulties for both the cooperative and its processor. For example, the optimal set of terms and condition for a cooperative may be affected by the composition of the membership, and logistical problems could be created for processors from large changes in cooperative membership. Therefore, some industry participants have suggested that the rule should be made permissive, rather than mandatory. That is, an eligible CV would not have to be qualified for a processor in order to join its cooperative, but would require the permission of the cooperative's current members. One possible middle course would be to make the rule mandatory with respect to qualified CVs, as currently drafted, but permissive for eligible but not qualified CVs.

Because the other AFA rules would be retained unchanged, the implementation of a contract would still require that it be signed by the owners of 80% of the catcher vessels that qualified for a processor by delivering the largest share of their catch to it. However, under the proposed new rule, between the date the contract was filed, expected to be December 1, and the end of the year, non-signers could join either the cooperative for which they were qualified, or any other cooperative. This could make it more difficult to implement cooperatives, because ICVs would have an incentive to not commit themselves to a cooperative by the filing date, in order to keep open the possibility of finding a more attractive cooperative to join. Therefore, if the proposed rule were adopted, consideration should be given to reducing the percentage required for approval below 80%.



The most important ambiguity concerning the interpretation of the proposed new rule is whether it would apply only when a new cooperative agreement is signed, or every year. This is a crucial distinction, because cooperatives are expected to have multiple-year durations. If the rule change applied only at the beginning of a cooperative contract, CVs would still have to go through open-access to change processors during most years. Furthermore, the duration of a cooperative agreement might be defined as the effective life of the AFA, in which case the proposed rule change would be moot.

In evaluating the effects of this alternative, we will assume that it is meant to apply in every year, and also that cooperative agreements will have annual withdrawal clauses. Therefore if this alternative were adopted, a CV could change processors in any year without going through open-access. As discussed in Section III.A, the potential cost of having to go through open access is a crucial consideration in considering the bargaining power of a CV within an AFA cooperative. By eliminating these costs, this proposed alternative would greatly improve the position of ICVs under the AFA.

Two principal objections to this proposed rule change have been expressed to us by representatives of inshore processors. The first objection rests on two assertions. One, annual withdrawal clauses, together with the elimination of the open-access requirement, would mean that cooperative agreements would effectively be annual contracts, regardless of their legal duration. Two, this would be very disadvantageous to processors, who need long-term agreements for operational purposes. We agree with the first assertion. We do not have sufficient technical knowledge of the industry to independently evaluate the second assertion, but note that fully binding long-term contracts do not appear to have been the norm in this fishery. Moreover, as discussed in Section III.B, long-term contracts are difficult to implement.

The second objection is that the proposed rule change would give CVs too much bargaining power. This objection can also be expressed in terms of two assertions. One, elimination of the open-access requirement is equivalent to adopting the Dooley-Hall proposal, because ICVs would be able to sell their fish to the highest bidder. Two, the effect on processors of the Dooley-Hall proposal would be disastrous because of the existence of excess capacity with the end of the race for fish.

With respect to the first assertion, we do not agree that the elimination of the open-access requirement is equivalent to adoption of the Dooley-Hall proposal. The most important difference between the two proposals is the organization of the cooperatives. Under Dooley-Hall the cooperatives could be organized more independently of processors, because a cooperative would not have to sell 90% of its fish to a single processor. Under the open-access proposal, the qualification rule implies that cooperatives would still need the approval of a single processor in the form of an agreement to process. Therefore processors would be expected to retain more influence concerning the operation of cooperatives than they would under the Dooley-Hall proposal.

While not as beneficial to ICVs as the Dooley-Hall proposal, the elimination of open-access could greatly enhance the bargaining position of ICVs. The analysis of the outcomes under Dooley-Hall can be used here as a lower bound, or worst case, evaluation of the possible outcomes for processors of the elimination of the open-access requirement. In both cases, the willingness of processors to forego apparent short-term competitive advantages in favor of their long-term interests in a highly concentrated industry would be a crucial determinant of the outcome.

If eliminating the open access requirement is feared to have consequences that are too dramatic, consideration could be given to alternatives that would reduce, but not eliminate, the costs of going through

open-access. We will briefly discuss two such alternatives: limiting catch in open-access, and partially guaranteeing harvest allocation in open-access.

#### *Limiting catch in open-access*

As discussed in Section III.A, if all the CVs in open-access were fully-vested (i.e., had harvest allocations consistent with their catching power), open-access would not be very costly for them. What can put a particular CV at a disadvantage is the presence of a large under-vested CV with catching power much larger than its harvest allocation. One possible approach, therefore, would be to limit the extent to which a vessel's harvest in open access could exceed its harvest allocation. For example, the limit on open-access catch could be equal to  $(100+C)\%$  of its harvest allocation, where  $C$  is greater than zero.

If  $C$  were close to zero, outcomes for all CVs in open access would be expected to be similar to their harvest allocations. If  $C$  were large, the outcomes would be similar to those under the AFA, with open-access being potentially very costly for fully-vested CVs.

#### *Guaranteeing harvest allocation in open-access*

An alternative approach is to guarantee any CV in open access the opportunity to catch a share,  $F\%$ , of its harvest allocation. If  $F$  were close to 100%, open-access would be very similar to a guaranteed harvest allocation for a CV. If  $F$  were close to zero, the outcomes would be similar to those under the AFA, with open-access being potentially very costly for fully-vested CVs.

The open-access pool would be reduced to reflect the guaranteed catch. Each CV would be expected to catch more than  $F\%$  of its harvest allocation, because it would be able to harvest fish from the remaining open-access pool in addition to its guaranteed catch. In aggregate, the total catch would not exceed the original open-access pool.

Either approach could have the effect of lowering the incentives to join a cooperative if the parameters were set too generously, that is, if  $C$  were set too low or  $F$  were set too high. For instance, if  $F$  were too high, CVs might choose to stay in open access and rationalization would be reduced because they would still race for a fraction  $(1-F)$  of the fish. Limiting the number of years a CV could remain in open access would be one possible amendment to these approaches. Other things equal, the shorter the time limit, the less these approaches would increase the bargaining power of ICVs.

TABLE 1

AFA RULES FOR INSHORE SECTOR COOPERATIVES

- a. Such cooperatives can be implemented beginning in 2000.
- b. The contract implementing a cooperative must be signed by the owners of 80 percent or more of the qualified catcher vessels that delivered pollock for processing by a inshore processor in the directed pollock fishery in the year prior to the year in which the fishery cooperative will be in effect.
- c. The contract must specify, except as provided in item j, that such catcher vessels will deliver pollock in the directed pollock fishery only to such inshore processor during the year in which the fishery cooperative will be in effect and that such inshore processor has agreed to process such pollock.
- d. The share of the inshore sector allocation available to the vessels in a specific cooperative will equal the percent of the inshore sector harvest of pollock in the pollock fisheries in 1995-97 accounted for by the vessels in that cooperative and the contract will prevent the members of a cooperative from catching more than that share. The Council is considering alternative catch history rules.
- e. The contract must allow the owners of other qualified catcher vessels to enter into such contract after it is filed and before the calendar year in which fishing will begin under the same terms and conditions as the owners of the qualified catcher vessels who entered into such contract upon filing.
- f. A catcher vessel shall be considered a "qualified catcher vessel" if, during the year prior to the year in which the fishery cooperative will be in effect, it delivered more pollock to the inshore processor to which it will deliver pollock under the fishery cooperative than to any other inshore processor.
- g. The contract shall, to the extent practicable, provide fair and equitable terms and conditions for the owners of qualified catcher vessel that delivered pollock to factory trawlers or motherships during 1995-97.
- h. The share of the inshore sector allocation not apportioned to the AFA cooperatives will in aggregate be available to the vessels that do not participate in a cooperative. Due to 1995-97 catch by catcher vessels that will not be eligible to participate in the inshore sector pollock fishery, that share will be greater than the percent of the inshore sector harvest of pollock in the pollock fisheries in 1995-97 accounted for by the vessels that do not participate in an inshore cooperative.
- i. The eligible vessels that are not in a cooperative may deliver pollock to any eligible inshore processor(s).

- j. A contract may provide for up to 10 percent of the pollock harvested under such cooperative to be processed by an eligible inshore processor other than the principal inshore processor to which pollock will be delivered under the contract.
- k. There are no provisions to allow one cooperative to transfer pollock to another cooperative. Therefore, for example, if one cooperative exceeded its apportionment, it could not correct for this error by acquiring pollock from another cooperative.

TABLE 2

ALTERNATIVE SETS OF RULES FOR INSHORE SECTOR COOPERATIVES

**1. The Dooley-Hall (Independent Catcher Vessel Owners) Proposal**

- a. No change.
- b. Substantial change. The contract implementing a cooperative must be signed by the owners of five or more catcher vessels eligible to harvest pollock in the directed pollock fishery and deliver it to an eligible inshore processor.
- c. Rule eliminated: A cooperative could deliver pollock from the BSAI pollock fishery to any eligible inshore processor(s).
- d. No change.
- e. Some change: The contract must allow the owners of other ~~qualified~~-eligible catcher vessels to enter into such contract after it is filed and before the calendar year in which fishing will begin under the same terms and conditions as the owners of the ~~qualified~~-eligible catcher vessels who entered into such contract upon filing.
- f. Rule eliminated.
- g. Some change. The contract shall, to the extent practicable, provide fair and equitable terms and conditions for the owners of ~~qualified~~-eligible catcher vessel that delivered pollock to factory trawlers or motherships during 1995-97.
- h. No change.
- i. No change.
- j. Rule eliminated: A cooperative would be able to decide what part of its allocation to deliver to any or each eligible inshore processor.
- k. No change.

**2. Replace the 10% transfer limit with a higher limit**

No change in the current AFA rules with the exception of item j.

- j. A contract may provide for up to x percent of the pollock harvested under such cooperative to be processed by an eligible inshore processor other than the principal inshore processor to which pollock will be delivered under the contract. The value of x has not been determined but it would be greater than 10.

**3. Allow any eligible catcher vessels to belong to any inshore cooperative (eliminate the qualified catcher vessel requirement)**

No change in the current AFA rules with the exception of item e.

- e. The contract must allow the owners of other ~~qualified~~ eligible catcher vessels to enter into such contract after it is filed and before the calendar year in which fishing will begin under the same terms and conditions as the owners of the qualified catcher vessels who entered into such contract upon filing.

Table 3

## Cooperative Shares if Qualification were Based on 1998 Deliveries

	Qualified Vessels:		Processor Controlled Vessels as Percent of Processor's	
	<u>Share of Assigned Inshore Allocation*</u>	<u>Cumulative Share of Assigned Inshore Allocation</u>	<u>Total Qualified Vessels</u>	<u>Share of Inshore Allocation</u>
By Facility				
	25.6%	25.6%	54.5%	84.7%
	24.9%	50.5%	7.1%	15.3%
	17.2%	67.7%	50.0%	66.4%
	12.6%	80.3%	66.7%	85.6%
	9.4%	89.7%	100.0%	100.0%
	8.5%	98.2%	50.0%	44.7%
By Company				
	35.4%	35.4%	59.4%	87.9%
	29.8%	65.2%	57.9%	74.5%
	24.9%	90.1%	7.1%	15.3%
	8.5%	98.6%	50.0%	44.7%
Total industry			45.5%	60.9%

\*The share of each entity in the total catch history assigned to catcher vessels that had deliveries in 1998, which accounted for 92.2% of the total inshore catch history.

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## **Appendix A**

### **Lessons from Agricultural Marketing and Bargaining Cooperatives**

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Draft membership agreements for pollock fishery cooperatives pay particular attention to the allocation of quota among cooperative members. Since the impetus for cooperative organization among pollock fishing boats derives largely from the opportunity provided by transferable quotas, this emphasis is not surprising. However, a cooperative structure requires attention to other important issues as well. Below, we review the following issues, with particular attention to the lessons from agricultural marketing and bargaining cooperatives:

- (a) features of a marketing/bargaining cooperative
- (b) control of a marketing/bargaining cooperative
- (c) functions of a bargaining cooperative in particular
- (d) combinations of marketing and bargaining functions
- (e) the bargaining process
- (f) possible pricing structures
- (g) prospects for success and ideas for the future

The terms “cooperative member,” “producer,” and “raw product supplier” will be used here interchangeably.

#### **Features of a Marketing/Bargaining Cooperative**

A cooperative is a firm that is owned by those who use its services, as distinguished from an investor-owned firm, namely one whose owners are not necessarily its users. Cooperatives which market their members' products are further divided into those which take title to their members' products in order to handle or process them, and those which do not take title but instead provide other services. Agricultural bargaining cooperatives normally fall into the latter category, although some bargaining cooperatives do take title to their members' products.

It is helpful to look briefly at the manner in which cooperatives which do take title allocate their net returns among members. Return allocation procedures fall into two alternative categories: allocation by individual account, and allocation by pool. In the individual account method, the cooperative segregates each member's product (in the fisheries case, the member's catch), sells it separately, and returns the revenue to the member less the variable and overhead costs of the cooperative's services. (Procedures for covering fixed or capital costs are discussed three paragraphs below.)

In the pooling method, the cooperative instead adds the revenue from the sale of all (or of a given subset) of its members' products, deducts the cooperative's variable and overhead costs, then allocates this pooled net revenue to each member according to a prearranged rule. A typical rule is that each member's share of the net revenue is determined by the proportion of the total value of raw product that the member contributed to the pool that year. That is, the member's share of the pooled net revenue equals the share of the raw product value he contributed to the pool. Computing such a share requires estimating the “prices”

of the raw products delivered by each member. These prices are often known in agricultural marketing cooperatives as “established” or transfer values and play a critical role in a cooperative’s organization. A cooperative may conduct one or more pools at a given time. Members’ products need not be physically commingled in order to sell them on a pool basis. However, once products are commingled, member incomes must be allocated through a pool because payment by individual account is no longer feasible.

Cooperatives that do not take title to members’ goods instead provide services to members, such as bargaining for contract terms with processors and providing member information. These coops have no revenues from which to deduct their costs, so must finance themselves in another way. Most typically, agricultural bargaining cooperatives charge members a fixed rate either per unit of product or per dollar of raw product value the member sells. If the charge is on a per-dollar-of-raw-product-value basis, “established values” must again be used.

Whether or not the cooperative takes title to product, it must subscribe equity capital from its members in order to cover fixed or capital costs. Cooperatives do so in one or more of three ways: membership application fees, withheld patronage dividends, and capital retains. Typically, little capital is raised through application fees. The second or withheld patronage dividend approach involves holding back a percentage of each member's net return allocation each year. That is, part of the cooperative's payment to a member is made in the form of an equity certificate, which is recorded in the cooperative's books in the member's name. The third or capital retains approach is to charge each member a fixed fee per unit or per unit value of the raw product that the member delivers to the cooperative. As with the withheld patronage dividend approach, an equity certificate is exchanged for this fee, which is recorded in the cooperative's books in the member's name.

The capital retains approach is used heavily by bargaining cooperatives because these cooperatives typically do not have any revenues as such and so have no patronage dividends to distribute to members. Even cooperatives that do earn revenues often draw part or all of their capital through capital retains. Most cooperatives revolve members' capital back to them after a certain period, either as determined annually by the board of directors or according to a fixed time interval as stated in the bye-laws. Interest may or may not be paid on the member's withheld capital, but usually is not paid. Nonpayment of interest creates no efficiency or fairness problem as long as each member's share of the cooperative's total equity capital stays roughly in proportion to that member's share of the value of product delivered.

### **Control of a Marketing/Bargaining Cooperative**

The cooperative’s constitution and bylaws distribute decision-making power among the board of directors, members, and hired employees. Some cooperatives choose to become members of a cooperative federation, which is a cooperative whose members are individual cooperatives. In that case, the constitution both of the cooperative federation and of the member cooperative determine the distribution of decision-making power between the federation and the member cooperative. Cooperative federations perform such functions as exporting or further-processing members’ goods, purchasing supplies, serving as information clearing houses, and representing members to the public and to policy makers. Cooperative federations are run democratically by the member cooperatives, just as member cooperatives are run democratically by the individual raw product suppliers.

Despite the compelling reasons raw product suppliers often have for forming a cooperative, a potential always exists for some members to free-ride on others. For example, if the cooperative’s per-unit costs decline as its volume grows (increasing returns to size), larger members can argue reasonably that

they contribute more to the coop's economic success than do smaller members. If, then, all members receive equal benefits per unit from patronizing the cooperative, smaller members free-ride on larger ones. On the other hand, larger members free-ride on smaller ones if the cooperative faces decreasing returns to size. Other sources of free-riding may also be present.

Claims that some members free-ride on others are a major source of cooperative failure. Why, then, do many cooperatives succeed? The academic literature suggests that cooperatives whose members are relatively homogeneous -- especially with regard to their size and to the type of product they harvest -- are more likely to be successful than are cooperatives whose members are relatively heterogeneous. The principal reason is that the greater the homogeneity, the less likely it is that some members can point to others as free-riding.

Coops whose members are very heterogeneous must do the best they can to limit the circumstances in which some members think that others are free-riding. One way of doing so is to use sliding scales when charging members for the cooperative's services. Another way of doing so is to give some members more votes than others have. In our own survey of forty-three agricultural marketing cooperatives, 63% allocated one vote to each member regardless of size, 9% allocated votes in proportion to a member's dollar volume of business with the cooperative, 7% allocated one vote to each member plus additional votes according to volume of business, and 14% allocated votes in proportion to each member's stock ownership in the cooperative. (Seven percent of the respondents did not answer the question.)

### **Functions of a Bargaining Cooperative in Particular**

The subset of marketing cooperatives known as bargaining cooperatives see their chief service as negotiating with processor/buyers over prices and terms of trade. Numerous agricultural bargaining cooperatives are organized under the Capper-Volstead Act, that is are exempt from certain anti-trust provisions by virtue of that Act. Although bargaining coops are registered under incorporation laws in their own states, only a few states, such as Michigan and California, have laws regulating their activities as specifically bargaining cooperatives.

Through the membership document, each member agrees that the bargaining cooperative will be the member's sole agent in negotiating contractual terms with processors. In agricultural cooperatives, membership usually is specified for a given quantity of the farmer's acreage rather than for a given quantity of the goods produced from it, since the quantity produced typically isn't known at the time of contract negotiations. Membership may or may not be closed; that is, the cooperative may or may not reserve the right to restrict the entry of given individuals or of given acreage to the cooperative. Although a cooperative normally wants as many members as possible, the demand for its product may sometimes be such that restricting entry of new members or of new acreage is in the best interest of the incumbent members.

Agricultural bargaining cooperatives normally distinguish between bargaining for "price" and bargaining for "terms of sale." "Price" refers to the base price corresponding to a reference product specification, which often is the lowest or highest grade of product available from members, or a grade that members commonly deliver. Anti-trust law, and perhaps the cooperative's self-interest, prohibits agricultural bargaining cooperatives from agreeing with processors on a particular price. Rather, agreement is reached on a minimum price that processors will pay for the reference product specification. Processors are free during the season to pay prices higher than this.

Agricultural bargaining cooperatives sometimes negotiate different base prices with different processors. However, they do so only to account for such cost factors as the differing locations of these processors. The reason is that bargaining cooperatives have a strong incentive to equalize the price paid to all members for a given quality of product. The literature of virtually every bargaining cooperative refers specifically to this equalization goal. In the absence of equalization, farmer dissension grows, sub-coalitions form among them, processors move to take advantage of the division, and members drop out.

In contrast to the base price, "terms of sale" refer to any combination of: (a) discounts and premia for selected grade standards, for selected varieties or species of product, or for alternative dates and places of delivery; (b) conditions under which the processor can refuse an entire lot; (c) division of responsibility for containers and for off-loading of product; (d) changes in the base price according to the portion of the season in which the product is delivered; (e) members' delivery schedules and permissible adjustments to these schedules to account for unforeseen events; and (f) means of redress of grievances between cooperative and processor. Terms of sale typically are included in a document, often called the "Master Document," separate from that stipulating the base price. In many cases, the Master Document is renegotiated only every two or three years, whereas base price is renegotiated every year. Terms of sale are nearly always the same for every member except for allowances regarding the plant or processor to which the product is shipped.

Besides negotiating over price and terms of sale, agricultural bargaining cooperatives offer other member services. The most important is regular dissemination of information about supply and demand conditions in the industry. Economic information of this sort not only helps members estimate the value of the bargaining cooperative's services, but also assists them in making short-term management and long-term investment decisions. Cooperative managers agree that the principal key to a bargaining cooperative's success is full and frequent communication among the manager, board, and members.

### **Combinations of Marketing and Bargaining Functions**

The distinction between a bargaining cooperative and one that takes title to or processes members' product is not straightforward. Some bargaining cooperatives, the California Canning Peach Bargaining Association in particular, take title to their members' products even though their principal goal is only to bargain for prices. The advantage of taking title is that members cannot drop out during the bargaining process; knowledge of this fact probably gives the cooperative greater bargaining leverage with processors. In addition, the cooperative can use its ownership of the product to perform marketing services for members, for example coordinating sales with individual processors and commingling the products of a group of members prior to a particular sale.

Most of the product which the Canning Peach Bargaining Association sells to processors is segregated by member. That is, payments to individual members are determined mostly by individual account rather than through a pool. However, the Association's ownership of the member's product permits it to pool product across members if market conditions warrant. In particular, product which does not move readily at prices the Association has negotiated is often commingled together and held in a pool, to be sold later. Returns from this pool are allocated according to the principles outlined above.

Obtaining title to members' products gives the bargaining cooperative another advantage: if the coop considers that prices and trade terms negotiated with processors are inadequate, it may seek a co-packing arrangement with one of the processors. In a co-packing arrangement, the cooperative and processor agree to share the proceeds of the pack in some manner. Such arrangements include profit-

sharing or an agreement under which the processor is paid a fixed fee for its services and the cooperative bears the full profit risk. Pollock cooperatives now forming in the Alaska fishery largely envisage themselves as bargaining with a single processor over prices and trade terms. However, they should bear in mind that pooling and/or co-packing generally remain as alternatives in the event that negotiations prove unfruitful.

## **The Bargaining Process**

Before negotiating with processors each year, an agricultural bargaining cooperative must ensure that it has sufficient support from farmers in the industry. Normally, support is reckoned in terms of the percentage of the acreage in that industry which is signed up with the cooperative in the form of a membership agreement. Some bargaining cooperatives say they need as little as 40% of the acreage in their industry in order to bargain effectively with processors. Other cooperatives say they need a minimum of 70%. An informal survey of agricultural bargaining cooperatives suggests that they represent between 45% and 80% of the acreage in their industries. Often, much of the remaining acreage is committed to another cooperative which takes title to and processes the members' goods. This, for example, is the case in the California raisin industry, where much of the acreage not represented by the Raisin Bargaining Association (RBA) is sold through a processing/marketing cooperative. The RBA and the latter cooperative have close informal ties with one another.

Because processors are forbidden by anti-trust law from colluding in the establishment of prices or terms of trade, a bargaining cooperative must negotiate individually with each processor. Some cooperatives seek first to bargain with the smaller or weaker processors, then move to the larger ones. However, the most frequent strategy seems to be to begin negotiating first with the larger processing firms. Only in California and in several other states are processors required to bargain. In any event, processors are free to offer different terms to different farmers, and in general to find various ways to encourage individual farmers to break from their cooperative organization. For example, processors are free to pay to cooperative nonmembers prices different than those that they pay to members.

Many bargaining cooperatives feel it is important to agree with processors first concerning terms of trade and only then concerning base price. Such a sequence helps assure farmer-members of a home for their product because, unlike base price, terms of trade are negotiated on a multi-year basis. In addition, agreeing first about trade terms helps processor and cooperative become familiar with one another's bargaining strengths and attitudes before they begin negotiations over the price level itself. Furthermore, trade term negotiations allow the cooperative to reveal the interests that it holds in common with the processor, such as the establishment of a price premium/discount schedule best suited to maintaining high product standards and timely raw product deliveries. Overall, agricultural bargaining managers seem to agree that it is usually better to discuss first the issues on which producer and processor are likely to agree.

Some agricultural bargaining cooperatives authorize a single negotiating team to bargain with all processors. Others establish a separate negotiating committee to work with each processor or plant. These processor-level committees come under the central direction of the cooperative manager and board. In any event, if agreement cannot be reached with a processor before the onset of the harvest season, the cooperative and processor may turn to a mediator, and if that is not successful, to an arbitration board. However, cooperatives usually try to avoid arbitration because it tends to undermine members' estimation of the cooperative's value.

## Possible Pricing Structures

Most agricultural bargaining cooperatives confine themselves to negotiating a base price (and associated terms of trade) to be paid in cash during that harvest season to the coop's members. Many coops in earlier years tried instead to utilize a price formula in which the price which processors would pay would depend upon such industry aggregate data as cold-storage inventories at time of delivery. However, these formulae proved too simplistic to capture all the factors that affect supply and demand, and hence value, of raw product.

Despite the failure of price formulae based on industry aggregate data, other alternatives to a simple annual cash price remain. One set of possibilities pertains to multi-year contracts. The California Tomato Growers Association presently is proposing to sign a two-year contract with canners in which a price would be set for each of the succeeding two years. The contract would state that, at the end of the first year of the contract, the second-year price would be renegotiated. Simultaneously, the price for the following (i.e. third) year would be determined. That is, contracts would be "rolling two-year-term" ones in which the second-year price would be renegotiated even as the following-year price is *originally* negotiated. Such an arrangement might help producer and processor plan for the future because, even though second-year prices could be changed through negotiation, they likely would not be changed appreciably unless both parties saw it in their interest to do so.

Along the same lines, the California Canning Peach Bargaining Association frequently utilizes rolling-ten-year contracts with processors. The Master Document in these instances allocates a given member's acreage to a given processor for the ten-year period, but states in only a general way how the price per ton will be determined each year.

In addition to multi-year contracts, the cooperative might negotiate price formulae in which raw product price is tied to the processor's performance. "Sales-minus" or revenue-share contracts are a case in point. In these contracts, the producer is paid a fixed percentage of the processor's resale price. If some of the processor's per-unit costs are deducted first from this resale price before the producer's share is computed, the contract instead is called a net-revenue-share or profit-share one. The latter contracts essentially treat the cooperative as if it were a full-fledged marketing cooperative, that is, as if it owned equity in the processing firm. The advantage of doing so is that producers are encouraged to act in accordance with the processor's interests, so that both producer and processor work to maximize the joint profit of the production and processing operation.

Except in cases in which the cooperative owns equity in the processor, agricultural bargaining cooperatives have not for the most part succeeded in negotiating revenue-share or net-revenue-share contracts with processors. One reason is that the processors' owners have been unwilling to share processing profit or revenue with those, like bargaining cooperative members, who do not bear the risk associated with equity ownership. Even bargaining cooperatives perceive that profit- or revenue-share contracts can be injurious to cooperative members. In the first place, processors can, in one cooperative leader's words, engage in "creative accounting" when computing the processor's revenues or costs. For example, prices to some of the processor's customers may be subject to adjustment because of discounts offered to these customers or because of special services provided to them. Costs may be subject to similar adjustment. In the second place, agricultural bargaining cooperatives acknowledge that when a processor must pay a portion of its revenues to cooperative members, the processor becomes ill-inclined to obtain the maximum price possible for its product. This hurts coop members because the processor then has less net revenue from which to pay for raw product supplies. As the manager of the California Canning Peach

Bargaining Association said, revenue-share contracts for raw product can be similar to raw product sales by consignment, because as the revenue share payable to the producer rises, the processor becomes simply a sales agent for the cooperative.

Nevertheless, profit- and revenue-share contracts have been used in a number of instances. Profit-share contracts between bargaining cooperatives and processors have been employed from time to time in the Florida citrus industry. And the Oregon Hazelnut Growers' Bargaining Association has, since 1983, obtained revenue shares from processors in the following way: If the processor's resale price (minus a discount if the processor adds much value through dicing, say, or adding chocolate) exceeds or falls short of the raw product price originally negotiated between cooperative and processor, producer and processor share the difference on a 50-50 basis. Recently, this arrangement has been amended as follows: If the resale price (possibly as discounted for costs as described above) drops *below* the originally negotiated raw product price, the raw product price is not reduced; but if the resale price rises *above* the originally negotiated raw product price, processors get the first three cents per pound of increase and producers get anything above that. In order for a revenue-share formula to be implemented, the processor's sales books must be audited by an independent auditor. The Hazelnut Bargaining Association acknowledges that, despite the overall success of its formula, processors are never happy about the auditing process.

### **Prospects for Success and Ideas for the Future**

Managers of agricultural bargaining cooperatives say it is unrealistic to expect cooperative bargaining to bring dramatic gains to members. Processor-cooperative bargaining is part of the process of discovery of the raw product price. The process requires both parties to take into account current information about the supply and demand for the processed product as well as about the cost of raw product production. When raw product suppliers conduct their bargaining process as a group, they probably enhance price "a little bit" relative to what the price would be if suppliers each negotiated prices independently of one another. This may be enough justification for the bargaining cooperative's existence.

As we have mentioned, cooperatives offer other valuable services as well, principally in supplying information to their members. Indeed, a bargaining cooperative is primarily in the information business. Effective information provision requires that the cooperative maintain wide contacts in its own industry and in related ones. For this and other reasons, a pollock fishery bargaining cooperative tied to a particular processor may well want to explore the possibility of joining with other Alaska pollock cooperatives in a cooperative union or federation. One role of the federation would be to gather and disseminate, to each member coop, information obtained from the other member coops and from the industry and general economy. Centralized information processing reduces fixed costs and enables the member coops to benefit in a timely manner from the other cooperatives' experiences. A pollock fisheries cooperative federation likely would also serve as the cooperatives' spokesman to individuals and groups outside the industry.

## **Appendix B**

### **Participants in Research Discussions**

F. Gregory Baker; Westward Seafoods  
Chris Blackburn; Alaska Groundfish Data Bank  
Al Burch; Alaska Draggers Association  
Bob Desautel; Nina Fisheries  
John Dooley; F/V Pacific Prince, F/V Caitlin Ann  
Dan Holland; National Marine Fisheries Service  
L. John Iani; UniSea  
Levis Kochin; University of Washington  
Lil Kuhr; Nina Fisheries  
Todd Lee; National Marine Fisheries Service  
Kent Lind; National Marine Fisheries Service  
Jim McManus; Trident Seafoods  
Joe Plesha; Trident Seafoods  
Edward J. Richardson; At-Sea Processors Association  
Chris Riley; Trident Seafoods  
Kathy Shepard; Nina Fisheries  
Dave Stanchfield; F/V Morningstar  
Peter Stitzel; Fisheries Business Consultant  
Joseph M. Sullivan; Mundt, MacGregor  
Joe Terry; National Marine Fisheries Service  
John G. Young; Young, deNormandie, and Oscarsson



## Appendix C

### Ownership Links for Catcher Vessels Tentatively Eligible to Operate in the BSAI Pollock Fishery

#### Independent vessel with no clear ownership link either to other AFA eligible catcher vessels or to an AFA eligible processor

1. AJ \*\*
2. Alaska Dawn
3. Aleutian Challenger (mothership eligible only)
4. Amber Dawn \*
5. American Challenger (factory trawler eligible only)
6. American Eagle
7. Cape Kiwanda
8. Caravelle
9. Collier Brothers
10. Endurance (Is it still a trawl vessel and is it eligible?)
11. Excalibur II
12. Exodus
13. Fierce Allegiance
14. Fierce Sea (mothership eligible only or none)
15. Forum Star (factory trawler eligible only)
16. Gold Rush
17. Golden Pisces
18. Hickory Wind \*\*
19. Lady Joanne
20. Lisa Marie
21. Lisa Melinda

22. Marathon
23. Margaret Lyn \* \*\*\*\*
24. Marcy J
25. Mark I \* \*\*\*\*
26. Messiah
27. Muir Milach (factory trawler eligible only)
28. Miss Berdie
29. Ms Amy
30. Oceanic \* \*\*\*\*
31. Ocean Harvester (factory trawler eligible only)
32. Ocean Storm ?
33. Pacific Challenger \*
34. Pacific Monarch \*\*\*
35. Pacific Ram
36. Pegasus
37. Peggy Jo
38. Raven
39. Royal American
40. Seeker
41. Topaz
42. Tracy Anne (factory trawler eligible only)
43. Vesteraalen (mothership eligible only) \*\*\*\*
44. Western Dawn \*

**Independent vessels with an apparent ownership link to one or more eligible catcher vessels**

Group 1

These two vessels are owned by one of the partners in the Northern Victor and they fish for the Northern Victor. That partner also is a partner in the Arctic Wind which fishes for Unisea and which is in Group 9 based on its other owners.

45. Poseidon

46. Royal Atlantic

Group 2

47. Auriga

48. Aurora

Group 3

49. Blue Fox

50. Seadawn

Group 4

51. Catlin Ann

52. Pacific Prince

Group 5

Ownership link to Golden Alaska

53. American Beauty (mothership eligible only)

54. Ocean Leader \*

Group 6

55. Gun-Mar

56. Mar-Gun \* \*\*\*\*

Group 7

57. Elizabeth F

58. Walter N

Group 8

59. Leslie Lee

60. Traveler \*

Group 9

61. Arctic Wind

62. Nordic Star

63. Starfish

64. Starlite

65. Starward

Group 10

66. Perseverance

67. Predator

Group 11

68. Alsea

69. Argosy

70. Progress

71. Vanguard \*

Group 12

72. Nordic Fury (mothership eligible only) \*\*\*\*\*

73. Pacific Fury (mothership eligible only) \*\*\*\*\*

Group 13

74. Ocean Hope 1

75. Ocean Hope 3

Group 14

Ownership link to the Excellence

- 76. Alyeska \* \*\*
- 77. California Horizon (mothership eligible only)
- 78. Misty Dawn (mothership eligible only)
- 79. Papado II (mothership eligible only)
- 80. Pacific Alliance ? (mothership eligible only, sank)

Group 15

- 81. Neahkahnie (factory trawler eligible only)
- 82. Sea Storm (factory trawler eligible only)

**Vessels with an apparent ownership link to an eligible inshore processor**

Alyeska Seafoods

Alyeska did not comment on this list (8/3/99).

- 83. Alaska Rose
- 84. Bering Rose
- 85. Destination
- 86. Great Pacific
- 87. Morning Star
- 88. Sea Wolf

Trident Seafoods (including Tyson)

Trident agreed with the list (8/3/99).

- 89. Aldebaran
- 90. Arctic I
- 91. Arctic III
- 92. Arctic IV
- 93. Arctic VI

- 94. Arcturus
- 95. Columbia
- 96. Dominator
- 97. Dona Liliana
- 98. Dona Martita
- 99. Dona Paulita
- 100. Flying Cloud
- 101. Golden Dawn
- 102. Majesty
- 103. NW Enterprise
- 104. Ocean Enterprise
- 105. Pacific Enterprise
- 106. Pacific Viking
- 107. Viking Explorer

Unisea Seafoods

- 108. Defender (F/V Defender 56676 Seattle)

Victor Seafood

Victor Seafood agreed with the list, these are catcher vessels owned by the same individuals who own the Northern Victor (8/6/99).

- 109. Anita J
- 110. Commodore
- 111. Half Moon Bay
- 112. Sunset Bay
- 113. Storm Petrel

### Westward Seafoods

Westward agreed with the list (7/29/99)

- 114. Alaskan Command
- 115. Chelsea K
- 116. F/V Westward I
- 117. Pacific Knight
- 118. Viking

Westward has at least partial ownership of these vessels but has direct control only of the Pacific Knight

- \* Vessels that are eligible to deliver to both inshore processors and motherships.
- \*\* Catch history is expected to be controlled by Westward Seafoods and used by the co-op that will deliver to Westward.
- \*\*\* Catch history is expected to be purchased and used by some of the members of the co-op that will deliver to Unisea..
- \*\*\*\* The owner of this vessel is a partner in the Ocean Phoenix.